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10/507,327

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Ryuichi Shinomura

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02/20/2008

ANTONELLI, TERRY, STOUT & KRAUS, LLP  
1300 NORTH SEVENTEENTH STREET  
SUITE 1800  
ARLINGTON, VA 22209-3873

EXAMINER

BHATNAGAR, ANAND P

ART UNIT

PAPER NUMBER

2624

MAIL DATE

DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/507,327

Applicant(s)

SHINOMURA ET AL.

Examiner

Anand Bhatnagar

Art Unit

2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 29 November 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 13-16 is/are rejected.
- 7) ☒ Claim(s) 10-12 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09/10/04 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 5, 8, and 13-16 are rejected under 35 U.S.C. 102(b) as being anticipated by Rocha et al. (U.S. patent 4,159,462).

Regarding claims 1 and 16: Rocha discloses an ultrasonic diagnostic apparatus comprising:

an ultrasound probe in which a plurality of transducer elements for transmitting and receiving an ultrasonic wave to/from an object to be examined are two-dimensionally arranged (fig. 3 elements 30-32, fig. 5 elements 31a-31f, col. 1 lines 58-65, and col. 4 lines 23-29, wherein a series of transducer elements are arranged in a linear formation in an ultrasound probe which transmit and receive echo signals. This linear formation is read as a two dimensional arrangement.);

transducer element selecting means for selecting a transducer element to be used in ultrasound transmission and reception (fig. 3 elements 30-32, fig. 5 elements 31a-31f, col. 1 lines 58-65, col. 4 lines 23-29, and col. 4 lines 23-40 wherein each of the transducers is selected at a specific time to send and receive the echo signals);

a signal processing unit for applying a delay time to a received wave signal received by the selected transducer element and performing signal processing (fig. 5 elements 41 and 42, col. 1 lines 55-67, and col. 5 lines 60-65, wherein a delay is placed in the echo signals);

an image processing unit for generating an image on the basis of a signal output by the signal processing unit (col. 1 line 65 to col. 2 line 3, wherein the signals are image processed to be displayed); and

an image display unit for displaying the generated image (fig. 5 element 44), wherein

the image processing unit includes storing means for storing a first ultrasound image obtained by a scan performed with a first transducer arrangement selected by the transducer element selecting means and a second ultrasound image obtained by a scan performed with a second transducer arrangement selected by the transducer element selecting means so as to irradiate an ultrasound beam in a different direction than a beam direction of the first transducer arrangement, and image calculating means for combining the first ultrasound image and the second ultrasound image (fig. 3, col. 1 lines 36-67 and col. 5 line 66 to col. 6 line 34, wherein the stored scan data from the transducer elements are combined to form an image and displayed. The scan and or sector scans are read as images since this is formed into image data. Further fig. 3 discloses the signals of the transducer elements scan in different directions ).

Regarding claim 2: An ultrasonic diagnostic apparatus wherein a beam formed by the second transducer arrangement intersects with that formed by the first transducer arrangement (fig. 3 wherein the signals are in different directions including intersecting at specific angles).

Regarding claim 3: An ultrasonic diagnostic wherein the image calculating means generates a combined image from tomographic information on a position where the ultrasound beams of the first ultrasound image and of the second ultrasound image intersect with each other (See claims 1 and 2. The different scans, i.e. images are combined to form an image).

Regarding claim 5: An ultrasonic diagnostic apparatus wherein the second ultrasound image is collected on the same portion as the first ultrasound image. See claims 1 and 2.

Regarding claim 8: An ultrasound diagnostic apparatus wherein the first transducer arrangement or the second transducer arrangement is a sparse array which forms a central position of ultrasound beams at a different position than that of ultrasound beams of the other transducer array (fig. 3 wherein the beams are at different positions and angles).

Regarding claim 13: An ultrasonic diagnostic apparatus wherein in the first transducer arrangement or the second transducer arrangement, an oblique angle of ultrasound beam is arbitrarily set by adjusting phasing data for each transducer element row (col. 3 line 65.to col. 4 line 15, wherein the signals and delays are compensated based on the angles of the signals, i.e. phases).

Regarding claim 14: An ultrasonic diagnostic apparatus wherein an arrangement surface of the transducer elements forms a convex shape in a direction of ultrasound transmission (fig. 5 element 44 wherein the scans have a convex shape).

Regarding claim 15: An ultrasonic diagnostic apparatus wherein the first transducer arrangement or the second transducer arrangement is divided into a plurality of transducer groups, and each transducer group is provided with a phasing circuit. See claims 1 and 13.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4, 6, 7, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rocha et al. (U.S. patent 4,159,462).

Regarding claims 4 and 7: Rocha does not teach the feature of "an ultrasonic diagnostic apparatus wherein the first ultrasound image is obtained by moving an aperture formed in the first transducer arrangement on a surface of the ultrasound probe and the second ultrasound image is obtained by moving an aperture formed in the second transducer arrangement on the surface of the ultrasound probe" nor teaches "wherein the first ultrasound image is obtained by

two-dimensionally moving the aperture of the first transducer arrangement on the surface of the ultrasound probe, and the second ultrasound image is obtained by moving the aperture of the second transducer arrangement in correspondence with a moving path of the first received signal.” Rocha further discloses that the focusing delay for the transducer array is a function of many variables including the aperture (col. 3 line 52-67). It would have been obvious to one ordinary skilled in the art to modify any of these variables including the apertures. One ordinary skilled in the art would have been motivated to vary the apertures to obtain the best focused image possible.

Regarding claim 6: Rocha does not teach the feature of “an ultrasonic diagnostic apparatus according wherein the image processing unit reconstructs a three-dimensional image from a plurality of ultrasound images.” This is a well known feature in the art of image processing. Examiner takes OFFICIAL NOTICE. It would have been obvious to one ordinary skilled in the art to incorporate this well known feature. One ordinary skilled in the art would have been motivated to incorporate this feature based on the availability of the hardware and/or software available at the time of invention.

Regarding claim 9: An ultrasonic diagnostic apparatus wherein the direction of the beam of the first transducer arrangement coincides with the direction of a normal line with respect to a body surface of the object. This is a well known feature in the art of image processing. Examiner takes OFFICIAL NOTICE. It would have been obvious to one ordinary skilled in the art to

incorporate this well known feature. One ordinary skilled in the art would have been motivated to incorporate this feature based on the availability of the hardware and/or software available at the time of invention.

***Allowable Subject Matter***

3. Claims 10-12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Ishrak et al. (U.S. patent 5,922,962) for a transducer array.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anand Bhatnagar whose telephone number is 571-272-7416. The examiner can normally be reached on M-F 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on 571-272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Application/Control Number:  
10/507,327  
Art Unit: 2624

Page 8

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



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February 18, 2008